

## BACKGROUND OF THE INVENTION

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A common means for caring for individuals suffering from incontinence is the use of an absorbent article, such as a urine-absorbent pad, worn inside a disposable diaper. A conventional urine-absorbent pad contains a facing layer and a backing layer, with an absorbent core interposed between the layers. The facing layer, which faces the wearer during use, is liquid-permeable. The backing layer, which faces the disposable diaper during use, is liquid-impermeable. The absorbent core is formed from crushed pulp or a mixture of crushed pulp and super absorbent polymer (SAP). In addition, the urine-absorbent pad has an adhesive layer which sticks to the inside of the disposable diaper for preventing the urine-absorbent pad from slipping out of place in the disposable diaper.

The urine-absorbent pad receives a liquid insult directly in the case of an incontinence episode, and has the capacity to retain an amount of urine excreted by an adult during one or two incontinence episodes. The pad must be replaced as it is saturated with urine, which depends on the frequency of episodes, in order to prevent liquid from moving to the disposable diaper. Thus, it is possible to avoid the replacement of the disposable diaper by frequently changing the wet pad. However, this is not always possible, such as during periods of sleep, when the urine-absorbent pad is left in place for a long time. After repeated liquid insults, the urine-absorbent pad cannot absorb additional liquid, which results in excess liquid leaking from the pad.

The problem is that the excess liquid flows to the side or periphery

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a2 (which is in contact with the groin) rather than to the center of the disposable diaper (absorbent area of the disposable diaper), because the backing layer of the urine-absorbent pad is impermeable to liquid and faces the center of the disposable diaper. The periphery of the conventional disposable diaper does not absorb urine sufficiently, thereby causing it to leak at the sides of the diaper, which results in wet clothes or sheets. This same problem also occurs if two sanitary napkins are worn together on top of each other.

#### SUMMARY OF THE INVENTION

The present invention provides an absorbent article that prevents liquid from leaking from the sides of the article.

The invention further provides an absorbent article which efficiently absorbs liquid when used in combination with another absorbent article.

Sub B2 In one embodiment of the invention, a first absorbent article is worn inside of a second absorbent article, wherein the first article contains a liquid-permeable facing layer which is in contact with the wearer, and a backing layer which is in contact with a second absorbent article. Here, the backing layer is formed from a liquid-impermeable sheet and has at least one opening made therein. In addition, an absorbent core is interposed between the facing layer and the backing layer.

In another embodiment of the invention, a first absorbent article is worn inside of a second absorbent article, wherein the first article contains a liquid-permeable facing layer

which is in contact with the wearer, and a liquid-permeable backing layer which is in contact with the second article, and an absorbent core interposed between the facing layer and the backing layer.

543<sup>b3</sup> The absorbent article of the present invention is designed for wear inside of another absorbent article such as a disposable diaper, urine-absorbent pad, or sanitary napkin. The absorbent article absorbs a certain amount of liquid by the absorbent core but permits excess liquid which remains unabsorbed by the core to pass through the backing layer for absorption by another absorbent article such as a

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disposable diaper. Accordingly, the leakage of excess liquid from the side of the absorbent article is prevented.

23 543<sup>b4</sup> The absorbent article can be modified such that the backing layer is provided with a liquid-impermeable covering sheet that can be removed at any time when necessary. With the covering sheet on, it stops the flow of urine; with the covering sheet removed, it permits the passage of urine. When frequent changes of the absorbent article are possible, such as during the daytime, it may be used with the covering sheet attached to prevent frequent replacement of the second absorbent article (e.g., a disposable diaper) used in combination with absorbent article. When frequent changes are unlikely, such as during periods of sleep, the absorbent article may be used with the covering sheet removed, thereby absorbing liquid efficiently and securely in combination with another absorbent article.

The absorbent article can be modified such that the backing layer is provided with an adhesive means for fastening the backing layer to another absorbent article. In such a structure, the absorbent article will not slip out of place, and the movement of liquid to the other absorbent article is ensured.

#### BRIEF DESCRIPTION OF THE DRAWINGS

23 Fig. 1(A) is a perspective view showing a urine-absorbent pad as an example of an absorbent article according to the invention;

Fig. 1(B) is a plan view of the urine-absorbent pad shown in Fig. 1(A), as viewed from a backing layer, with a covering sheet attached;

Fig. 1(C) is a plan view of the urine-absorbent pad shown in Fig. 1(B), as viewed from the backing layer, with the covering sheet removed;

Fig. 2 is a perspective view which illustrates how the urine-absorbent pad of Fig. 1(A) is used in combination with a disposable diaper;

Fig. 3 is a plan view which illustrates how the urine-absorbent pad shown in Fig. 1(A) is used in combination with a disposable diaper;

Fig. 4 is a schematic sectional view taken along the line IV-IV in Fig. 3;

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art sub 35 Fig. 5 is a perspective view of the urine-absorbent pad shown in Fig. 1(A) which is folded for use by a man, with its shape modified so as to enclose a penis;

**Fig. 6(A)** is a plan view of a urine-absorbent pad as another example of the absorbent article according to the invention, as viewed from a backing layer, with a covering sheet attached;

**Fig. 6(B)** is a plan view of the urine-absorbent pad shown in **Fig. 6(A)**, as viewed from the backing layer, with the covering sheet removed;

**Figs. 7(A) and 7(B)** are perspective views of examples of openings;

**Fig. 8(A)** is a plan view of a urine-absorbent pad as another example of the absorbent article according to the present invention, as viewed from a backing layer, with a covering sheet attached;

**Fig. 8(B)** is a plan view of the urine-absorbent pad shown in **Fig. 8(A)**, as viewed from the backing layer, with the covering sheet removed; and

**Fig. 9** is a plan view of another embodiment of the urine-absorbent pad shown in **Fig. 8(A)**, with the covering sheet removed.

#### DETAILED DESCRIPTION OF THE INVENTION

A urine-absorbent pad, as an example of one embodiment of the absorbent article according to the invention, is shown in **Fig. 1(A)** (perspective view), **Fig. 1(B)** (plan view as viewed from a backing layer, with a covering sheet attached), and **Fig. 1(C)** (plan view as viewed from the backing layer, with the covering sheet removed).

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a4 The urine-absorbent pad 20 comprises a liquid-permeable facing layer 21 which faces the wearer during use, and a backing layer 22, which faces a disposable diaper during use, and an absorbent core 23 which is interposed between the two layers.

The facing layer 21 can be made from a nonwoven fabric of hydrophilic fibers hydrophobic fibers containing a hydrophilic surfactant, or the like.

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The facing layer 21 can be formed by various processes such as point bonding, through-air bonding, spun bonding, or spun lacing.

The backing layer 22 is made of a liquid-impermeable, breathable sheet of resin, such as polyolefin.

a5 The absorbent core 23 is formed from crushed pulp or a mixture of crushed pulp and Super-Absorbent Polymer (SAP), and is covered with an absorbing sheet 23a such as tissue. (See Fig. 4.) The Sap can be made of polyacrylic acid, sodium polyacrylate, polyacrylamide, polyacrylonitrile, polyvinyl alcohol, an addition polymer of maleic anhydride, a polyether, a condensed polymer, a polysaccharide such as starch or cellulose, a protein such as collagen and the like. Examples of the SAPs include a cross-linked compound of sodium polyacrylate, a graft copolymer of starch having sodium polyacrylate and a graft copolymer of cellulose having polyacrylonitrile chains.

The absorbent core 23 is rectangular in shape as indicated by the dotted lines in Figs. 1(B) and 1(C). It may also take on an hourglass shape. With the absorbent core 23

interposed between the facing layer **21** and the backing layer **22**, the layers are then bonded together with a hot-melt adhesive, or the like, along the periphery of the absorbent core **23**.

As used herein, the "absorbing area" refers to the area which is surrounded by the dotted lines in **Figs. 1(B)** and **1(C)** and the area of the absorbent core **23**.

as The urine-absorbent pad **20** has elastic members **24** which are disposed between the facing layer **21** and the backing layer **22** and extend in the lengthwise direction (**Y** direction) of the urine-absorbent pad **20**. The elastic members **24** exist in side areas where the absorbent core **23** is absent (i.e., outside of the absorbing area in the widthwise direction (**X** direction) of the urine-absorbent pad **20**). The elastic members **24** are bonded to the facing layer **21** and the backing layer **22** when stretched in the **Y** direction (with a certain elongation percentage). In their free state, they shrink in the **Y** direction, causing the facing layer **21** and the backing layer **22** to form gathers **25** on both side areas of the urine-absorbent pad **20** in the **X** direction.

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a6 As shown in **Fig. 1(C)**, the backing layer **22** is made of a liquid-impermeable resin sheet and has openings **22a**, through which openings the absorbing sheet **23a** (e.g., tissue) covering the absorbent core **23** is exposed. In this embodiment, the openings **22a** constitute liquid-passing areas indicated by (**a**).

The openings **22a** (or the liquid-passing areas (**a**)) are arranged side by side approximately at the center of the absorbing area in the widthwise direction (**X** direction) and are elongated parallel to each other in the lengthwise direction (**Y** direction). In other words, they

are situated substantially at the center of the absorbing area. The area of the openings 22a is smaller than that of the absorbing area.

ab The backing layer 22 has an adhesive layer 26 as an adhesive means. The adhesive layer 26 is formed on the backing layer 22 in such a way as to surround the openings 22a individually. This adhesive layer 26 aids in fastening a covering sheet 27 to the outside of the backing layer 22, as shown in Fig. 1(B). Thus the covering sheet 27 closes the openings 22a. In other words, the adhesive layer 26 surrounds the openings 22a completely, and the covering sheet 27 is bonded to this adhesive layer 26. Therefore, with the covering sheet 27 attached, the liquid-passing areas (a) are closed and the backing layer 22 of the urine-absorbent pad 20 prevents liquid from passing through.

sub 27 The covering sheet 27 is made of a liquid-impermeable and breathable sheet of resin such as polyolefin, like the backing layer 22. The adhesive layer 26 is formed from a gum adhesive or acrylic resin to permit removal of the covering sheet 27 at any time from the backing layer 22, and retains a certain adhesive power even after the covering sheet 27 has been removed. When the urine-absorbent pad 20 is used in combination with a disposable diaper, the adhesive layer 26 (with the

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a7 covering sheet 27 removed) adheres to the inside of the disposable diaper. As a result, the urine-absorbent pad 20 is prevented from slipping out of place. In addition, because the



urine-absorbent pad **20** is in contact with the disposable diaper, the passage of urine to the disposable diaper is secured.

The covering sheet **27** has a tab **27a** formed at its end. This tab **27a** is not bonded to the backing layer **22**.

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The urine-absorbent pad **20** is used in combination with a disposable diaper **1** (shown in Figs. 2 and 3) one over the other, with the former placed inside of the latter. The disposable diaper **1** has the shape of an hourglass and consists of a front part **1A** (faces the abdomen of the wearer in use), a rear part **1B** (faces the hip or back of the wearer in use), and a middle part **1C** (faces the groin in use).

The disposable diaper **1** has a liquid-permeable inner layer **2** and a liquid-impermeable outer layer **3**, with an absorbent body **4** interposed between them. The absorbent body **4**, which has the shape of an hourglass, is formed from crushed pulp or a mixture of crushed pulp and SAP and is enclosed with an absorbing sheet such as tissue.

The middle part **1C** of the disposable diaper **1** has longitudinally extending elastic bodies **5** at its side edges and between the inner layer **2** and the outer layer **3**, so that the elastic bodies **5** form gathers **6** when they shrink.

The inner layer **2** of the rear part **1B** has fasteners (hooks) **7** at its edges. The outer layer **3** of the front part **1A** also has fasteners (piles) **8**. To wear the disposable diaper **1**, the fasteners **7** and **8** are engaged with each other around the waist of the wearer.

Although the disposable diaper **1** described herein is an example of the open type, the urine-absorbent pad **20** of the invention may also be used in combination with a disposable

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diaper of the pants type in which the front part 1A and the rear part 1B are bonded together at their edges.

If the user can frequently change the absorbent pad, for example, during the daytime, the urine-absorbent pad 20 is used with the covering sheet 27

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reference to Fig. 4. The excess urine which is not absorbed by the absorbent core 23 of the urine-absorbent pad 20 passes through the openings 22a to be absorbed by the absorbent body 4 of the disposable diaper 1. Thus, it is possible to cope with frequent episodes of incontinence.

ab  
In another embodiment of the absorbent article of the invention, the urine-absorbent pad may be modified as shown in Figs. 6(A) and 6(B). Fig. 6(A) is a plan view of the urine-absorbent pad, as viewed from the backing layer. Fig. 6(B) is a plan view of the urine-absorbent pad, with the covering sheet removed.

A urine-absorbent pad 30 shown in Fig. 6(A) is similar in structure to the urine-absorbent pad 20 shown in Fig. 1(A). It has a facing layer and a backing layer, with an absorbent core interposed between them, and has gathers (formed by elastic members extending in the Y direction) on both of the side areas thereof. Therefore, it is made of the same materials and is used in the same manner as the absorbent pads described above.

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The urine-absorbent pad 30 has a backing layer 31 which is made of liquid-impermeable resin film (such as polyolefin), similar to the backing layer 22 of the urine-absorbent pad 20. The backing layer 31 has a number of openings 31a which almost

entirely cover the absorbent core (or absorbing area), as shown in Fig. 6(B). In other words, this embodiment is constructed such that the liquid passing area (b) substantially coincides with the absorbing area (the area containing the absorbent core). Incidentally, the openings 31a may be formed in the entire area of the backing layer 31 although they are confined to the absorbing area in this particular embodiment.

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a Each of the openings 31a are preferably circular, with a diameter larger than 0.5 mm, preferably larger than 1 mm. The openings 31a are preferably arranged with a pitch greater than 1 mm, preferably greater than 1.5 mm. The advantage of establishing the size and pitch of the openings 31a as described above is that the liquid-passing area (b) of the urine-absorbent pad 30 can be recognized visibly. This avoids the possibility of mistaking an ordinary urine-absorbent pad, in which the backing layer does not have the liquid-passing area, for one of the invention.

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29 Sub 89 In the case of the urine-absorbent pad 30 in which the openings 31a are formed so as to almost entirely cover the absorbent core (or the absorbing area), it is necessary to provide an adhesive layer 32 as described below to ensure proper adhesion between the backing layer 31 of the urine-absorbent pad 30 and the inner layer 2 of the disposable diaper 1. Thus, the adhesive layer 32 is preferably formed in the absorbing area (or the area in which the absorbent core exits). Assuming that the area in which the adhesive layer 32 is formed has dimensions of L1 by W1,

a9 the length L1 (Y direction) should be equal to or smaller than the length L0 of the absorbent core but greater than 50% of the length L0. In addition, it is preferred that the total area of the adhesive layer 32 is less than 60% of the area of the absorbent core in order to ensure the smooth flow of urine from the backing layer 31 to the disposable diaper 1.

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a10 sub 310 The openings may be positioned and shaped as shown in Figs. 7(A) and 7(B). In Fig. 7(A), comparatively large round (or elliptic) holes 31b are formed in a line extending in the lengthwise direction (Y direction) and approximately at the center of the urine-absorbent pad. In Fig. 7(B), one large hole 31c is formed almost equal to the absorbing area (or the area in which the absorbent core exists).

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a11 sub 311 Incidentally, the coating pattern of the first adhesive layer 42 is not limited to a striped pattern, but may take on any shape, such as dots or spirals.

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a12 Sub B10 The first adhesive layer 42 and the second adhesive layers 43, as described above, prevent the covering sheet 44 from inadvertently being removed or peeled off, because the side portions of the covering sheet 44 are attached to the backing layer 41 by the second adhesive layers 43. When the covering sheet 44 is removed from the backing layer 41, the first adhesive layer 42 (in a striped pattern) appears at the center (in the widthwise direction) of the backing layer 41 and adheres to the inside of the disposable diaper 1, thereby preventing the urine-absorbent pad

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a13 Sub B13 A third adhesive layer 45 as a third adhesive means may be formed on the covering sheet 44 as shown in Fig. 8(A). When the urine-absorbent pad 40 is used with the covering sheet 44 attached, and in combination with the disposable diaper 1, the inner layer 2 of the diaper 1 is fastened (bonded) to the third adhesive layer 45 so that the urine-absorbent pad 40 stays in position. It is important that the adhesive force of the third adhesive layer 45, when applied to the inner layer 2, is weaker than that of the second adhesive layers 43 applied to the covering sheet 44. This embodiment aids in preventing inadvertent removal of the covering sheet 44 from the backing layer 41 when the urine-absorbent pad 40 is removed from the disposable diaper 1.

Page 16, delete the last paragraph and insert the following paragraph: